VIA EFS

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Patent Application of: Pierattilio Di GREGORIO			
Conf. No.:	2819	Group Art Unit:	1732
Appln. No.:	10/811,604	Examiner:	Patrick Butler
Filing Date:	MARCH 29, 2004	Attorney Docket No.:	6023-175US (BX2592M))

Title: METHOD FOR PRODUCING THERMO-INSULATING CYLINDRICAL VACUUM PANELS AND PANELS THEREBY OBTAINED

APPEAL BRIEF TRANSMITTAL LETTER

Enclosed are the following:

[X]	Appellant's Brief Under 37 C.F.R. § 41.37;	
[X]	A Petition for Extension of Time with requisite fee; two-month	
[ ]	A check in the amount of $ to cover the filing fee.	
[X]	The Commissioner is hereby authorized to charge Deposit Account No. 50-1017 (Billing No. **206023.0175**) as noted below.	
	[X]	Appellant's Brief fee in the amount of $500.00.
	[X]	Any deficiencies or overpayments in the above-calculated fee.

Respectfully submitted,
Pierattilio Di GREGORIO

September 14, 2007 By: [signature]
(Date)

WILLIAM W. SCHWARZE
Registration No. 25,918
AKIN GUMP STRAUSS HAUER & FELD LLP
One Commerce Square
2005 Market Street, Suite 2200
Philadelphia, PA 19103-7013
Telephone: 215-965-1200
Direct Dial: 215-965-1270
Facsimile: 215-965-1210
E-Mail: wschwarze@akingump.com

WWS/rdb

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

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ON APPEAL FROM THE PRIMARY EXAMINER TO THE BOARD OF PATENT APPEALS AND INTERFERENCES

APPELLANT'S BRIEF UNDER 37 C.F.R. § 41.37

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I. REAL PARTIES IN INTEREST

The real party in interest in the above-captioned application ("the present application") is SAES GETTERS S.p.A., an Italian corporation, having a place of business at Viale Italia 77, Lainate (Milano), Italy, the assignee of the present application.

II. RELATED APPEALS AND INTERFERENCES

There are no other prior or pending appeals, interferences, or judicial proceedings known to Appellant, Appellant's legal representative or assignee which are related to, will directly affect or be directly affected by, or will have a bearing on the Board's decision in this present appeal.

III. STATUS OF CLAIMS

Claims 1-8, 12, and 13 are pending. Claims 9-11 and 14 were cancelled. A clean set of all pending claims is set forth in the Claims Appendix. The claims are presently under final rejection. Claims 1-8, 12, and 13 are the subject of this appeal.

IV. STATUS OF AMENDMENTS

Amendments filed on August 7, 2006 have been entered in the Office Action dated August 23, 2006 (Paper No. 20060817, page 2, ¶ 2).

V. SUMMARY OF CLAIMED SUBJECT MATTER

The claimed invention is a method for producing cylindrical thermo-insulating vacuum panels. Vacuum panels generally have a planar configuration that can easily be used on planar surfaces, but are not suitable for bodies having substantially cylindrical walls. The presently claimed invention addresses the need for a non-planar vacuum panel by applying a calendering operation to a planar vacuum panel. The possibility of using such an operation was not previously foreseeable because the discontinuity of the filling materials of the panels made the deformation behavior of the filler under mechanical stress difficult or impossible to evaluate. Furthermore, polymeric foam fillers are so fragile that it was previously believed that calendering a panel containing such fillers would break (¶ [0013] of the present specification).

The cylindrical vacuum panel is shown in Fig. 2 of the application. It includes two facing sheets sealed together at their edges to form an envelope between them (¶ [0005]). Each of the

two facing sheets comprises a barrier sheet that has a thickness not greater than 100 μm (¶ [0005]). As recited in claim 13, the barrier sheet may be a multilayer sheet that comprises at least one metal layer. To space the facing sheets apart, the envelope formed between the facing sheets is filled with at least one porous or discontinuous filling material selected from the group consisting of inorganic powders and porous organic foams, such as silica powder and rigid polyurethane foams (¶ [0006]). A vacuum is created in the envelope, such that pores and interstices in the filling materials are evacuated (¶ [0006]). The resulting panel may have a thickness less than 20 mm (¶ [0019]). For example, claim 5 recites that the thickness for a panel having a filler of rigid polyurethane foam is between 8 and 15 mm. The presently claimed invention preferably includes the use of a getter material in the panel, so that residual gases may be adsorbed and/or reacted (¶ [0006]).

The panel thus formed is curved by a calendering operation (¶ [0012]). For example, the planar vacuum panel is passed between at least two rollers and a third element, such as another roller, having a length at least equal to that of the rollers and placed parallel to the "nip" between the first two rollers (¶ [0020]). Adjustment of the position of the third element dictates the radius of curvature of the final product, and this position can be continuously modified during the calendering operation (¶ [0021]). The presently claimed invention optionally includes the use of an adhesive polymeric foam, which is placed on the planar panel, such that the calendering operation occurs on the adhesive polymeric foam and the panel simultaneously (¶ [0022]).

The method of the presently claimed invention has the advantage that the panels can be bent with simple and inexpensive equipment, just before they are fixed in the final utilization place. In their pre-calendered planar form, the panels are stackable, and efficiently occupy space. Thus, the transportation or storage of large volume products (i.e., non-planar vacuum panels) is not required (¶ [0023]).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The Office Action of February 13, 2007 contains final rejections of claims 1-8, 12, and 13.

A. The Examiner has rejected claims 1-4, 7, 12, and 13 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,107,649 of Benson et al. ("Benson") in view of U.S.

Patent No. 5,792,539 of Hunter, U.S. Patent No. 6,189,354 of Späth ("Späth"), and Applicant's admission on page 1, ¶ [0005] of the specification.

B. The Examiner has rejected claims 5 and 6 under 35 U.S.C. § 103(a) as being unpatentable over Benson, in view of Hunter, Späth, Applicant's admission, and U.S. Patent No. 6,336,693 of Nishimoto ("Nishimoto").

C. The Examiner has rejected claim 8 under 35 U.S.C. § 103(a) as being unpatentable over Benson, Hunter, Späth, Applicant's admission, and U.S. Patent No. 4,011,357 of Haase ("Haase").

VII. ARGUMENT

A. Summary of Argument

The ultimate issue in this appeal is whether or not it would have been obvious to use a calendering operation on a vacuum panel. This method is not described or suggested in the prior art. As stated in the present specification, a calendering operation has never been used, or even considered, because it was expected that the deformation of the panels under mechanical stress would be unpredictable, due to the discontinuity of the filling materials. Particularly in the case of a polymeric foam filler, breaking of the foam board during calendering would have been expected. The Examiner proposes using a calendering operation for strong metal profile sections to curve the thin skinned, fragile vacuum panels to which the claimed invention is directed. Such a proposal clearly would not have been obvious to one skilled in the art.

B. The Current Law of Obviousness

1. The U.S.P.T.O Memorandum regarding KSR International Co. v. Teleflex Inc.

Several days after the Supreme Court decision in *KSR v. Teleflex* 82 USPQ2d 1385 (US 2007), the Deputy Commissioner for Patent Operations issued a MEMORANDUM dated May 3, 2007 (copy enclosed), noting the following points, while the Office is studying the opinion and until further guidance is issued :

(1) The Supreme Court reaffirmed the *Graham* factors, including:

(a) determining the scope and the content of the prior art;

(b) ascertaining the differences between the prior art and the claims;

(c) resolving the level of ordinary skill in the pertinent art ; and

(d) evaluating evidence of secondary consideration;

(2) The Supreme Court did not totally reject the use of "teaching, suggestion, or motivation" as a factor, but recognized that it could provide helpful insight in determining the obviousness question;

(3) The Court rejected a rigid application of the TSM test ; and

(4) The Court noted that the analysis under §103 should be made explicit:

> "Often, it will be necessary...to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the market-place; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an **apparent reason** to combine the known elements in the fashion claimed by the patent at issue. To facilitate review, this analysis **should be made explicit**." KSR, Slip OP. at 14 (emphasis added).

The memorandum of the Deputy Commissioner concluded:

> **"Therefore, in formulating a rejection under 35 U.S.C. § 103(a) based upon a combination of prior art elements, it remains necessary to identify the reason why a person of ordinary skill in the art would have combined the prior art elements in the manner claimed."** (Emphasis in original)

C. The References Relied Upon by The Examiner

1. U.S. Patent No. 5,107,649 of Benson et al. ("Benson")

Benson is directed to multiple embodiments of vacuum insulation panels. Although Benson discloses many embodiments, the gist of his invention can be generally characterized in two embodiments. The first embodiment ("Benson Embodiment I") encompasses the structure characterized in Fig. 1, while the second embodiment ("Benson Embodiment II") encompasses structures characterized by Fig. 15.

Benson Embodiment I is an insulation panel comprising two outer sheets 12, 14 closely spaced apart. The seams around the edges where the two outer sheets meet are sealed, for example by welding at 18 (col. 6, lines 30-34). The gas in the interior chamber enclosed by the sheets is evacuated, providing a vacuum therein (col. 6, lines 34-38). To maintain a spacing between the sheets and to avoid contact of the sheets with one another, glass spacers, such as

spherical beads, are positioned inside the interior chamber (col. 6, lines 27-48). A panel according to the invention of Benson is described to be "fabricated very effectively and beneficially" in an overall thickness range of about 2.5 mm (2500 μm) thick, while the sheets "can be" 0.2-0.3 mm (200-300 μm) thick (col. 11, lines 49-55). The sheets 12 and 14 are described as being formed of a low thermal conductivity metal, such as stainless steel or titanium, which are sufficiently hard or rigid so as not to deform around the spherical spacers, yet are bendable enough so the panel can be formed in curves (col. 6, lines 48-54).

Benson Embodiment II is a composite panel containing multiple panels of Benson Embodiment I, which are stacked or laminated together to form a composite panel, as shown in Fig. 15. Benson discloses that the laminate can be produced by embedding or adhering the panels of Benson Embodiment I to a conventional insulation material such as rigid or flexible foam insulation or powder (col. 8, lines 55-58). The conventional insulation materials surround the insolation panels, and are not used as filler material inside the panel. Benson discloses that composite panels of such a structure can be easily formed around curves or used in any shape desired (col. 8, lines 66-68). However, Benson does not disclose how the panels are curved.

2. U.S. Patent No. 5,792,539 of Hunter ("Hunter")

Hunter is directed to thermal insulation barriers that are placed inside an insulation panel comprising multiple stacked or nested insulation elements. Hunter also discloses two basic embodiments. The first embodiment ("Hunter Embodiment I") encompasses the structure characterized in Fig. 1, while the second embodiment ("Hunter Embodiment II") encompasses the structure characterized by Fig. 10.

Referring to Fig. 1, Hunter Embodiment I is directed to an insulation barrier that can be placed between two surfaces 20 and 30 (col. 4, lines 9-12). The barrier comprises alternating stacking thermal insulation elements 12 and 14, formed from a thin sheet material, each having a specific "beam design," or repetitive three dimensional design that protrudes perpendicular to the plane of the panel. The thermal insulation elements serve to fill the space between a hot surface and a cold surface, thereby reducing the heat transfer by convection of the gases in the space (col. 4, lines 26-29). The three-dimensional protrusions of one thermal insulation element communicate with the three dimensional protrusions of other thermal insulation elements,

thereby facilitating a stacked configuration (col. 5 lines 21-24). "Stacking" occurs when the corresponding three dimensional designs of two adjacent insulation elements fit together one within the other, while also minimizing surface contact between the two elements (col. 4, lines 47-51). Minimizing the surface contact between the elements limits the heat path and therefore minimizes heat transfer across the insulation barrier (col. 6, lines 15-32). Variations of thermal insulation barriers within the general scope of Hunter Embodiment I are characterized in Figs. 2-9. Figs. 8 and 9 depict thermal insulation barriers that are capable of bending around a curved surface. However, Hunter does not disclose how these thermal insulation barriers are bent.

Hunter Embodiment II is illustrated in Figs. 10 and 11, and is only addressed very briefly in col. 9, lines 16-49. Rather than being formed from a thin sheet material as in Hunter Embodiment I, the thermal insulation elements of Hunter Embodiment II are made of a solid, formable, open structured material each element having "a substantial cross sectional area" (col. 9, lines 19-23). The solid material may comprise compacted powders, such as silica, or may comprise open celled ceramic foams (col. 9, lines 24-28). The solid, open structured materials are cut from a long block or molded to form a three dimensional design on only one side, so that the thermal insulation element is flat on one side, and contoured on the other side. The thermal insulation element 18 is fitted against another thermal insulation element 19, such that the contoured side of thermal insulation element 18 is stacked on the contoured side of the thermal insulation element 19, with a tension element 14 interspaced between them. It should be noted that, unlike Hunter Embodiment I, Embodiment II is not described as being bendable.

3. U.S. Patent No. 6,189,354 of Späth ("Späth")

Späth, which is unrelated to the field of the invention, discloses a modular multi-station device for bending sections of hollow metal, such as tubes. The device of Späth seeks to improve known methods of bending metal sections that involve "closed design" machines that cannot be modified. The device of Späth improves upon these machines by modularizing parts of the machine into various sections: a bending station, a guide and roller station, and a support station. Referring to Fig. 1, the device includes a roller bending station 1, which comprises bending station 17, guide and roller station 15, and support station 16. The device further includes center roller station 11, carriage 3, and carriage track 2. A section to be bent is placed on carriage track 2, and is supported by a mandrel (mandrel rod 7, mandrel balls 9). In addition,

the device of Späth eliminates the need for an expensive thrusting station to feed metal sections to be bent into rotational driver rollers to achieve a desired shape. The device of Späth replaces the thrusting station with rotationally driven rollers (col. 1, lines 9-23).

4. Applicant's admission on page 1, ¶ [0005] of the specification ("Applicant's admission")

The Examiner has relied upon Applicant's statement on page 1, ¶ [0005] of the specification, which states,

> "As known, a vacuum panel is formed of an envelope inside which a filling material is present. The envelope has the function of preventing (or reducing as much as possible) the inlet of atmospheric gases inside the panel, so as to keep the degree of vacuum compatible with the thermal insulation level required by the application. For this purpose, the envelope is made with so-called "barrier" sheets of thickness generally not greater than 100 μm, characterized by a gas permeability being as low as possible."

D. The Examiner's Position with Respect to claims 1-4, 7, 12, and 13

Referring to Benson Embodiments I and II, the Examiner contends that Benson discloses a known procedure for producing a planar thermo-insulating vacuum panel, as described in col. 4, lines 40-52, comprising an envelope having two facing barrier sheets sealed at their edges, shown in Fig. 15, reference numeral 82. Referring to Benson Embodiment II, the Examiner further contends that Benson teaches, in column 16, lines 25-29, that the panel contains at least one filler selected from the group consisting of inorganic powders and porous organic foams. The Examiner also contends that Benson teaches, in col. 9, lines 22-26 and Fig. 18, that the panel can be curved into a cylinder.

The Examiner acknowledges that Benson fails to disclose using at least one filler selected from the group consisting of inorganic powders and porous organic foams inside the vacuum envelope. However, in referring to Hunter Embodiment I, the Examiner contends that Hunter teaches a bendable vacuum panel (col. 8, lines 57-67). Then, referring to Hunter Embodiment II, the Examiner further contends that Hunter teaches that the panel contains the presently claimed filler (col. 9, lines 21-29).

The Examiner concludes that it would have been obvious for a person of ordinary skill in the art at the time of the invention to include a powder or foam as taught by Hunter in the panel

taught by Benson, in order to increase the R-value. The Examiner argues that the R-value would be increased by including powder or foam because foam has multiple gas pockets trapping air, and Hunter recognizes, in col. 6, lines 40-43, that stationary air inhibits heat transfer.

The Examiner acknowledges that Benson does not disclose the method by which the panel is curved. However, the Examiner contends that Benson discloses that the panel may comprise metal sheets (col 4, lines 8-17) and that Späth teaches a method for curving hollow metal sheets (col. 1, lines 6-8) through calendering by using two rollers and a third element of equal length placed parallel to the two rollers, as shown in Fig. 1.

The Examiner concludes that it would have been obvious to a person of ordinary skill in the art to curve the panels taught by Benson using the method taught by Späth, because doing so would produce a curved hollow metal sheet so that the hollow section is protected against bulges, nicks, or against any other kind of deformation (Späth, col. 1, lines 15-18).

The Examiner acknowledges that Benson does not disclose that the vacuum panel comprises at least one metal sheet having a thickness not greater than 100 μm. However, because Applicant admits that thicknesses of 100 μm in vacuum panel barrier sheets are known, the Examiner argues that it would have been obvious for a person of ordinary skill in the art to assemble and curve a vacuum panel as taught by Benson in view of Späth having a barrier sheet thickness of less than 100 μm. The alleged motivation to do so would have been to create a high-performance insulation material occupying less volume that is therefore more valuable (Benson, col. 12, lines 12-14).

E. The Examiner has Failed to Establish *Prima Facie* Obviousness With Respect to Any of the Claims

1. There would have been no apparent reason to combine the teachings of Benson and Hunter, because Benson teaches away from using powder and foam fillers.

The Examiner contends that it would have been obvious to include a powder or foam as taught by Hunter in the panel taught by Benson because doing so would increase the R-value, since Hunter recognizes that stationary air inhibits heat transfer. However, the motivation provided by the Examiner is squarely contrary to the teachings of Benson. Benson actually teaches away from powder and foam fillers, because such fillers negatively affect the quality of the vacuum seal and offer more direct heat conduction paths through the insulation panel.

As explained in the Declaration of Paolo Manini Under 37 C.F.R. § 1.132 ("the Manini Declaration," Copy enclosed in Evidence Appendix), Benson acknowledges that vacuum panels are more effective than conventional foam and fiberglass insulation panels (col. 2, lines 54-59 of Benson). This is true because thermal conductivity occurs through the transfer of energy between molecules. Since a vacuum is by definition a space that is devoid of matter, thermal conductivity is not possible. In practice, a perfect vacuum is not achievable, but, according to Benson, even low grade vacuums, such as the prior art panels described by Benson in col. 2, lines 26-54, provide insulation superior to foam/fiberglass insulation panels.

Thus, Benson seeks to improve upon known vacuum panels and addresses the problem of long term vacuum loss in high-order vacuums. Specifically, Benson is directed to metal envelops with welded metal seams. Benson explains that metal envelopes with welded seams will hold a vacuum, but that leak-free welds are difficult to achieve in the presence of conventional spacers 5, such as glass fiber mats and perlite powders, because such fillers contain "billions of microscopically fine glass fibers and perlite particles," and a single particle or fiber intruding into a weld could create a microscopic leak (col. 3, line 62 – col. 3, line 6).

Benson additionally discloses one further disadvantage of using conventional fillers as spacers. In addition to inhibiting the formation of a leak-free weld, Benson teaches that the fillers used in high-order vacuums compact under external pressure. The compacted fillers in turn create undesirable direct heat conduction paths through the insulation panel (col. 3, lines 15-20). Thus, the fillers not only reduce the quality of the vacuum seal, they also increase the thermal conductivity of the entire panel, thus decreasing insulation effectiveness.

As an improvement over these conventional filler materials, Benson teaches using glass spacers that space apart the panel sheets (col. 6, lines 27-48). Unlike conventional fillers, the glass spacers do not particulate, and therefore do not interfere with the formation of a good seal in the welded metal edge. In addition, the spherical glass spacers of Benson maintain only a "point" contact with the panel sheets, thus limiting the thermal conduction path and increasing thermal efficiency (col. 8, lines 15-19).

In view of Benson's teaching that it is undesirable to use a filler that contains microscopic particles and/or compacts under compression, a person of ordinary skill in the art at the time of the invention would not have been motivated to use inorganic powders or porous organic foams[1].

Furthermore, the Examiner's position that one would be motivated to combine Benson and Hunter to increase R value, because Hunter teaches that stabilizing air gas pockets increases R-value, is misguided. The Examiner has taken the position that because a perfect vacuum is impossible to attain in practice, some gas will always be present in a vacuum panel, so one would always be motivated to use a powder or foam filler, as these fillers would trap the residual air in the vacuum panel thereby inhibiting heat transfer[2]. However, in forming this rejection, the Examiner has dismissed fundamental principles that are well understood in the art in favor of his own theoretical conjecture. In actual practice, whatever thermal resistance is gained by trapping air pockets in an imperfect vacuum by using filler is at best canceled out and at worst diminished as a result of the increased number of direct heat conduction paths formed by the structure proposed by the Examiner. This is supported by the disclosure of Benson itself (col. 3, lines 15-20), as well as the Manini Declaration (¶ 15).

In view of the above, there would have been no apparent reason, and certainly no reasonable expectation of success, in combining Benson and Hunter.

2. There would have been no apparent reason to combine the teachings of Benson with Applicant's admission, because Benson specifies a minimum barrier sheet thickness at least twice that presently claimed.

Benson explicitly sets forth the ideal operating thicknesses of the barrier and the individual sheets. Benson provides a value for minimum thickness of 200 μm (col. 11, lines 53-54), which is twice the thickness of the barrier sheet of the presently claimed invention. In relative terms, Applicant's admitted thickness is significantly below (greater than 50% below) the thickness range provided, and one of skill in the art would not have had any motivation or apparent reason to disregard the preferred range set forth by Benson. To illustrate, Benson states

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[1] It should be noted that in addition to the undesirability of powder fillers as taught by Benson, the Manini Declaration specifically addresses the Examiner's proposed use of a foam filler in the panel of Benson. In particular, the Manini Declaration states "porous organic foams likewise have a tendency to generate powders, and hence would be excluded by the teachings of Benson for at least that reason." (¶ 11).

[2] It is the Examiner's position that "[a]bsent unattainable complete evacuation, air remains in a panel. Thus, Hunter's teaching of stabilizing air remains relevant." Page 10 of Office Action of August 23, 2006.

that the sheets must be sufficiently hard or rigid so they do not form around the spherical spacers (col. 6, lines 52-53). It therefore follows that the 200 μm sheet thickness specified in Benson meets the sufficiently rigid requirement set forth in Benson's disclosure, and that deviating below this range would result in unwanted deformation of the sheets. Nevertheless, the Examiner argues (Feb. 13, 2007 Office Action, pg. 4):

> At the time of the invention, it would have been obvious to a person of ordinary skill in the art to assemble and curve a vacuum panel as taught by Benson et al. in view of Späth et al. having a barrier sheet of less than 100 μm thickness. The motivation to do so would have been to create a high-performance insulation material occupying less volume that is therefore more valuable (Benson et al., column 12, lines 12-14).

The section of Benson upon which the Examiner relies describes the space saving benefits of a thin yet highly insulative panel of Benson, and compares such a panel (15 R per inch) against other types of insulation (2 to 4 R per inch for inexpensive bulk insulation, and 5 to 10 R per inch for expensive expanded foam). A simple calculation[3] reveals that a panel of Benson having an R value of 15 would save between 1.4 and 7.4 inches of space over the insulation materials described in col. 12, lines 12-20 of Benson.

In contrast, the Examiner proposes a space reduction of a mere 200 μm (0.0078 inch) per panel (100 μm per sheet, 2 sheets per panel), which, in comparison to the above described space reduction, is essentially negligible. The 0.0078 inch saved by reducing the wall thickness increases the risk of panel failure and would, at best, achieve nothing more than an insignificant return on space reduction. No person of skill in the art would risk the structural integrity of the panel for such negligible space reduction.

If sheets of a thickness less than the 200 μm minimum specified were used in a panel of Benson, it is highly likely that the atmospheric pressure exerted on the panel would structurally damage the sheets. For example, the sheets would deform around the spacers, and even possibly break at these points (Manini Declaration ¶ 20). In view of this, there would have been no

[3] The range of R values for expanded foam products and bulk insulations is 2-10 R per inch (col. 12, lines 16-20). A 0.1 inch thick insulation panel of Benson has an R value as high as 15. To achieve a panel with equivalent R value using a panel of expanded foam or bulk insulation, the thickness would have to be between 1.5 and 7.5 inches thick. (15R / 2R per inch = 7.5 inches; 15R / 10R per inch = 1.5 inches) Thus, using a 0.1 inch thick panel of Benson saves 1.4 to 7.4 inches of space over the conventional insulation materials.

apparent reason whatsoever for a person of skill in the art to modify the thickness of the panel walls of Benson to a thickness of 100 μm or less.

3. There would have been no apparent reason to combine the teachings of Benson, Hunter, and Applicant's admission with the teachings of Späth, because Späth would not be expected to be usable with thin, fragile vacuum panels.

First, Späth's disclosure indicates that it is directed to bending metal portions having thickness ranges at least an order of magnitude thicker than the metal envelope formed by the 100 μm panel walls (metal sheets) of the present invention and Benson. Späth teaches a device for bending metal profiles, specifically, hollow sections, such as metal tubes (col. 1, lines 7-8 and col. 9, lines 37-38). The invention of Späth is designed to eliminate the expensive thrusting station used in known bending machines to exert a high thrusting force ("in the range of several tons") to feed the section to be bent (col. 1, lines 19-23).

Späth replaces the thrusting station with a device having rotationally-driven rollers that drive the metal portions through the bending machine. The rollers feed the bending machine by using a "high degree of friction" between the metal portion and the rollers to drive the portion along, thereby eliminating the need for a thrusting station (col. 3, lines 33-56). To explain further, the rollers exert a force on the metal section sufficient to achieve a frictional force strong enough to drive the metal section through the bending station. For example, Späth teaches that a pressure of 50 kN (5 metric tons) is exerted by the center rolling and guide roller on a metal section to be bent, where the metal section has a cross-section in the range of 40 to 220 mm (col. 6, lines 36-39).

Since Späth indicates that the force required to feed the metal portion through the bending station is in the range of several tons, it is clear that the metal portions must have considerable strength and thickness, significantly greater than the 2.5 mm thick panels of Benson[4] (alternatively, 2.3 mm thick panels, if the space saving method proposed by the Examiner, as discussed above, is used) with fragile glass beads as spacers, to withstand the bending operation. A person having ordinary skill in the art would not have had an apparent reason to use equipment specifically designed for applying high force on such a thin and fragile panel as Benson's. There would have been even less reason to do so with the thinner skinned panels of Benson modified by Applicant's admission having 100 μm or less barrier sheets.

[4] Benson, col. 11, lines 49-52

Second, the reason provided by the Examiner for why one of skill in the art would use the bending operation of Späth to curve the panel of Benson completely misconstrues the teachings of Späth. The Examiner argues (Feb. 13, 2007 Office Action, pg. 3):

> At the time of the invention, it would have been obvious to a person of ordinary skill in the art to curve the panels taught by Benson et al using the method taught by Späth. The motivation to do so would have been to produce a curved hollow metal sheet so that the hollow section is protected against bulges, nicks or against any other kind of deformation (Späth, column 1, lines 15-18).

However, the mere act of forming a curve in the panel of Benson using the bending operation of Späth would not itself necessarily achieve any protection against bulges, nicks, or other deformation. Plainly stated, just because a panel is curved does not mean that it is protected. The passage of Späth on which the Examiner relies for motivation actually states that *guided rollers* are intended to prevent bulges and nicks of the section to be bent. In other words, Späth is implying in this passage that the bending operation makes the metal section to be bent *more* susceptible to bulges and nicks. To reduce the likelihood of incurring damage during the operation, guided rollers are used, which thereby prevent bulges and nicks in the section to be bent. There is no evidence of record that bending or curving the panels of Benson or Benson modified by Hunter and Applicant's admission makes them more susceptible to bulges and nicks. In fact, this should not be the case, because Benson uses spacers between the walls of the panel. Therefore, a person of skill in the art would not be motivated to perform the bending operation of Späth in order to protect a panel of Benson or Benson as proposed to be modified from bulges, nicks or against any other kind of deformation. On the contrary, such an operation would likely cause damage to the panel.

The Examiner's rejection is explicitly based on the alleged motivation and obviousness to curve the panels taught by Benson using the method taught by Späth (Feb. 13, 2007 Office Action pg. 3). However, to make any sense, the allegedly obvious modification should have been curving the panels of Benson modified by Hunter and Applicant's admission using the method taught by Späth. As already discussed above in Sections VII E .1 and 2, there would have been no apparent reason to combine the teachings of Benson with either Hunter or

Applicant's admission and therefore no basis to curve that proposed combination using the method of Späth.

Moreover, there is no teaching in Hunter that the panel of Hunter Embodiment II (the only embodiment that includes a filler of a solid, formable, open structured material, comprising compacted powders, or open celled ceramic foams) is actually bendable or flexible at all, much less capable of withstanding the bending operation of Späth. On the contrary, the Manini Declaration (¶ 22) states that the materials cited by Hunter at col. 9, lines 24-28 (Hunter Embodiment II) are all known to be rigid, and are not at all likely to be bendable.

Finally, the disclosure of Hunter itself suggests that these filler materials are rigid and not flexible. If the fillers of Hunter Embodiment II were flexible as contended by the Examiner, in a structure like that of Fig. 10, the walls 20 and 30 would compress the elements 18, 19 against the element 14 under the action of external pressure. As a result, the peculiar feature of the Hunter panels of having vacuum spaces between stacked elements would be lost. In other words, it is necessary that the "teeth" of elements 18, 19 be able to resist the pressure exerted by the panel walls, so that the material of which they are made must necessarily be rigid. The Examiner's assumption of flexibility of the Hunter fillers is groundless, and the entire Hunter disclosure shows clear evidence to the contrary.

F. The Examiner has Failed to Establish *Prima Facie* Obviousness With Respect to 5, 6, and 8

1. The Examiner's Position with Respect to Claims 5 and 6

With regard to claims 5 and 6, the Examiner acknowledges that the combination of Benson, Hunter, Späth, and Applicant's admission does not teach a vacuum panel having a thickness in a range of 5 to 20 mm (*sic.*, 8 to 15 mm, claim 5) or a vacuum panel having a thickness between 5 and 20 mm (claim 6). However, the Examiner contends that Nishimito discloses in col. 3, lines 47-58, that it is known to construct vacuum panels using hard polyurethane foam and having a thickness in a range of 10 to 20 mm. The Examiner concludes that at the time of the invention, it would have been obvious to a person of ordinary skill in the art to increase the thickness of the panel taught by Benson in view of Hunter, Späth, and Applicant's admission to between 5 and 20 mm as taught by Nishimoto, because doing so would increase the insulating properties of the panel.

2. There would have been no apparent reason to combine the teachings of Benson, Hunter, Applicant's admission, and Späth with the teachings of Nishimoto, because Benson explicitly provides an ideal panel thickness and because the combination goes against the teachings of Benson.

The Examiner argues that since Nishimoto teaches constructing vacuum panels having a thickness in a range of 10 to 20 mm, it would have been obvious to increase the panel thickness of Benson in view of Hunter, Applicant's admission, and Späth to such range. In providing the motivation for this combination, the Examiner contradicts the very motivation he has provided to support the combination of Benson with Applicant's admission.

That is, the Examiner states that a person of skill in the art would reduce the thickness of the panel walls of Benson, as taught by Applicant's admission in order "to create a high-performance insulation material occupying less volume." However, with respect to the overall thickness of the vacuum panel, the Examiner now contends that one of skill in the art would choose to increase the thickness, in order to increase the insulating properties of the panel.

These motivations are clearly in conflict with one another, and well exemplify the Examiner's tendency to pick and choose isolated elements from various references, without any consideration to the propriety of the combination as a whole. A person of skill in the art would not simply increase the size of any vacuum panel for the sake of increasing insulation properties alone.

Benson provides what he considers to be the ideal panel thickness range, which is about 2.5 mm (col. 11, lines 49-52). Since the focus of Benson is to provide an ultra-thin insulation panel (abstract), a person of skill in the art would not have had any apparent reason to increase the overall thickness of a panel of Benson by one order of magnitude in view of Hunter, Applicant's admission, and Späth, as taught by Nishimoto.

3. The Examiner's Position with Respect to Claim 8

With regard to claim 8, the Examiner acknowledges that the combination of Benson, Hunter, Späth, and Applicant's admission does not teach that a polymeric adhesive placed on the panel is in a foam state. However, the Examiner contends that Benson teaches spacer beads coated with polystyrene or similar adhesive material are affixed to the wall sheets of the planar

vacuum panel (col. 7, lines 9-14). The Examiner further contends that Haase teaches that polystyrene can be foamed (col. 2, lines 47-56). The Examiner concludes that it would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made to have placed adhesive polymeric foam on at least one face of a vacuum panel and to curve the panel through calendering, because it can be reasoned that foamed polystyrene would be a similar adhesive material to polystyrene as disclosed by Benson, and because polystyrene has desirable insulating properties.

4. The Examiner fails to provide a reason to combine the teachings of Benson, Hunter, Applicant's admission, and Späth with the teachings of Haase.

Haase, which is unrelated to the field of the presently claimed invention, is directed to a method for producing a laminate comprising a polystyrene film to a polystyrene foam such that disorientation of the oriented film is eliminated (abstract). The Examiner argues that a person of skill in the art would have been motivated by Benson in view of Hunter, Applicant's admission, Späth and Haase, to calender a planar panel having at least a layer of adhesive polymeric foam placed on at least one face of the panel. The Examiner seems to believe that because of Haase's mere teaching that polystyrene can be foamed and Benson's teaching that foamed polystyrene has desirable insulation properties, the method of calendering a panel as recited in claim 8 would have been obvious.

No apparent reason is provided for performing a calendering operation on a planar panel having a layer of adhesive foam. The Examiner fails to provide sufficient motivation for combining Haase with respect to Benson, much less an apparent reason for combining this reference with Benson in view of Hunter, Applicant's admission, and Späth. Benson's only teaching with respect to a polymeric foam adhesive states that spacer beads <u>inside</u> the vacuum panel can be coated with polystyrene. This teaching has nothing to do with calendering a panel having an adhesive layer of polymeric foam on at least one <u>face</u> of the panel.

G. Conclusion

The Examiner has spent a great deal of time and effort providing tenuous arguments explaining how it might have been possible for the proposed combinations to work. However, the legal standard of *prima facie* obviousness lies in a showing of "a preponderance of evidence,"

which requires that the evidence to be more convincing than the evidence which is offered in opposition to it.

> "With regard to rejections under 35 U.S.C. § 103, the examiner must provide evidence which as a whole shows that the legal determination sought to be proved (i.e., the reference teachings establish a prima facie case of obviousness) is more probable than not." MPEP § 2142.

The Examiner has ignored the verified factual submissions and reasoned conclusions for a persons skilled in the art of the present invention (See Manini Declaration) or has substituted his own speculations about the prior art without citing any factual basis or reliable rebuttal to these submissions and conclusions. A prima facie determination of obvious relies upon a showing of a reasonable expectation of success (MPEP § 2143.02), which the Examiner has not established. The Examiner has totally failed to show any apparent reason why one of ordinary skill in the art would even try to use a calendering method for strong metal profile sections using tons of force to attempt to curve or bend a thin, fragile vacuum panel.

Finally, the Examiner has failed to consider the references as a whole. Rather the Examiner has impermissibly used hindsight to pick and choose, out of context, isolated elements across various embodiments of various references, has combined these isolated elements without regard to actual teachings of the references themselves and has ignored explicit and implied teachings of the references away from the proposed combinations[5]. Even after the Supreme Court decision in *KSR*, it is still necessary to determine whether there was an apparent reason to combine the known elements in the fashion claimed by applicant and to make the analysis explicit (USPTO Memorandum of May 3, 2007).

In view of the foregoing discussion, it is respectfully submitted that the Examiner's rejections of claims 1-8, 12, and 13 are improper and should be reversed by the Board. Reversal of the rejections and a Notice of Allowance are respectfully requested at the earliest opportunity.

---

[5] Although it is recognized that the mere number of references used to make a rejection is not in itself grounds for reversal, it is noted that the Examiner requires at least four (4) references to reject claims which recite a simple two-step method.

Respectfully submitted,
Pierattilio Di Gregorio

September 14, 2007 By: Wm W Schwarze
(Date)

WILLIAM W. SCHWARZE
Registration No. 25,918
AKIN GUMP STRAUSS HAUER & FELD LLP
One Commerce Square
2005 Market Street, Suite 2200
Philadelphia, PA 19103-7013
Telephone: 215-965-1200
Direct Dial: 215-965-1270
Facsimile: 215-965-1210
E-Mail: wschwarze@akingump.com

WWS/ADL

Attachments:	VIII	Claims Appendix – Claims in Present Form
	IX	Evidence Appendix
	X	Related Proceedings Appendix
	XI	Authorities Appendix

VIII. CLAIMS APPENDIX

CLAIMS IN PRESENT FORM
U.S. PATENT APPLICATION NO. 10/811,604
FROM AUGUST 7, 2006 AMENDMENT

1. A method for producing cylindrical vacuum panels comprising the steps of:

producing a planar, thermo-insulating vacuum panel having two facing sheets each comprising a barrier sheet having a thickness not greater than 100μm, the two facing sheets sealed at their edges to form an envelope, at least one porous or discontinuous filling material selected from the group consisting of inorganic powders and porous organic foams filling the envelope formed by the facing sheets, and a vacuum created in the panel, wherein pores and interstices in the filling materials are evacuated and the filling material functions to space the facing sheets apart; and

curving the panel by a calendering operation.

2. The method according to claim 1, wherein the calendering operation is carried out by passing the planar vacuum panel between at least two rollers (2, 3) and a third element of length equal at least to a length of the two rollers and having a position_parallel to the two rollers.

3. The method according to claim 2, wherein the third element is a third roller (4).

4. The method according to claim 1, wherein the planar vacuum panel comprises, as filling material, a rigid polyurethane foam, and has a thickness less than 20 mm.

5. The method according to claim 4, wherein the panel has a thickness between 8 and 15 mm.

6. The method according to claim 1, wherein the planar vacuum panel comprises, as filling material, silica powder, and has a thickness between about 5 and 20 mm.

7. The method according to claim 2, wherein the position of the third element is continuously modified during the calendering operation.

8. The method according to claim 1, wherein the calendering operation is carried out simultaneously on the planar panel and on at least a layer of an adhesive polymeric foam placed on at least one face of the panel.

12. The method according to claim 1, wherein the planar vacuum panel contains at least one getter material.

13. The method according to claim 1, wherein the barrier sheet is a multilayer sheet and comprises at least one metal layer.

IX. EVIDENCE APPENDIX

A. Declaration of Paolo Manini under 37 C.F.R. §1.132

VIA EFS

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Patent Application of: Pierattilio Di GREGORIO		:		
Conf. No.:	2819	:	Group Art Unit:	1732
Appln. No.:	10/811,604	:	Examiner:	Patrick Butler
Filing Date:	March 29, 2004	:	Attorney Docket No.:	6023-175US(BX2592M)
Title:	METHOD FOR PRODUCING THERMO-INSULATING CYLINDRICAL VACUUM PANELS AND PANELS THEREBY OBTAINED			

DECLARATION OF PAOLO MANINI UNDER 37 C.F.R. § 1.132

I, Paolo Manini, declare and state as follows:

1. I am presently employed by SAES Getters S.p.A. ("SAES"), the assignee of the above-identified patent application, as Manager of the Vacuum Systems Business Area. In the period 1998-2003 I was the manager of the Vacuum Thermal Insulation Business Area which includes research and development in the field of the invention described and claimed in the above-identified patent application. I am making this Declaration in place of the inventor, Pierattilio Di Gregorio, who quit the company and is unavailable to make the Declaration.

2. My educational background and training are as follows. I graduated cum laude in Physics from Milan University in 1984 with a thesis in solid state physics. As a university student my studies included vacuum technology (included in the more general course on electromagnetic waves and plasma physics) and laboratory sessions (Plasma Physics and Solid State Physics) where vacuum equipment and apparatuses where routinely used. My post-graduation studies included short courses on "surface science" and "thin film deposition technologies," organized by AIV (Italian Vacuum Association) and AVS (American Vacuum Association).

3. My work history and experience are as follows. After graduation, I joined Honeywell Information Systems Italia in 1985 as a researcher in charge of technological and failure analysis on silicon integrated circuits. In 1986 I joined the SAES corporate R&D laboratories as a researcher. During the following years I was in charge of studying and characterizing getter alloys and materials for several vacuum applications. As the head of the SAES Gas-Surface laboratory, I managed the activities of a team of 12 people in charge of investigating getter properties and developing novel getter solutions for industrial applications (lamps, vacuum thermal insulation, displays, etc.). From 1992-1998, I was responsible for the development of a specific getter solution (Combogetter®) for Vacuum Insulation Panels (VIPs). This work required extensive investigation and understanding of the properties of fillers, barriers, getters, and panel manufacturing processes. In late 1998 I moved to the Commercial Division of SAES as Manager of the Vacuum Thermal Insulation Business Area to follow this growing business. In this function, I was the organizer of the European Workshop "Vacuum Panel Technology for superinsulators in domestic appliances and industrial applications" held in Milan, November 1998, which sparked high interest in VIPs and led to the creation of the first Vacuum Insulation Association (VIA), based in the US and having SAES as one of the founding companies. I took part, as a member of the technical team, in the preparation of the ASTM C1484-01 standard on vacuum insulation panels, which was issued in 2001. I am an affiliate of the AIV (Italian Vacuum Association), sitting on the steering committee of the Association since 1989 and being currently Vice-President. Following an internal re-organization in business units of SAES, I moved recently to a new position as Manager of the Vacuum Systems Business Area, which deals with getter products for high and ultra high vacuum applications. I am author of more than 30 scientific publications related to vacuum, getter technology, material science, and vacuum insulation panels, as well as an inventor or co-inventor in several patents in the same fields.

4. Based upon my educational background, training, work experience, and the many years I have worked in this art, I believe that I am considered an expert in the field of thermo-insulating vacuum panels and the production thereof.

5. I am familiar with the prosecution history of the above application, and in particular, the final Office Action dated December 19, 2005. I am also quite familiar with the prior art relied upon by the Examiner, particularly U.S. Patents 5,792,539 of Hunter, 5,107,649 of Benson et al. and 6,336,693 of Nishimoto. I have also read and studied U.S. Patents 6,189,354 of Späth and 4,011,357 of Haase, both of which are totally unrelated to the presently claimed invention.

6. I am submitting this Declaration in order to correct the erroneous assumptions, misunderstandings and faulty reasoning of the Examiner in making the obviousness rejections in the final Office Action, and to demonstrate the non-obviousness of the presently claimed invention over the prior art relied upon by the Examiner.

Benson's Approach to Reducing Thermal Conductivity

7. At column 2, Benson poses the problem that ultra-thin, highly effective and long-lasting insulation panels are not easy to make (col. 2, lines 20-22), and goes on to discuss various attempts to improve insulation effectiveness with vacuum panels. However, while conceding that these prior art vacuum panels are more effective than conventional foam and fiberglass insulation panels, Benson concludes that truly effective and long-lasting insulation panels are not achieved by these prior art structures to the extent necessary (col. 2, lines 54-59).

8. Among the problems of such prior art panels is that plastic edge seals cannot maintain a vacuum over an extended period of time due to degradation and out gassing of plastic materials. Further, metal envelopes with welded seams will hold the required vacuum, but have the drawback that leak-free welds cannot be achieved in practice when the filler material includes "billions of microscopically fine glass fibers and perlite particles" as used in prior art panels, because a single particle or fiber intruding into the weld could create a microscopic leak (col. 2, line 62 – col. 3, line 6).

9. Benson's solution to these problems is to use envelopes obtained by welding two adjacent metal sheets spaced closely together with a plurality of spherical or glass or ceramic beads or other discrete shapes, which provide mechanical support and space while "minimizing

thermal conductance" (col. 4, lines 8-17). Such glass or ceramic beads minimize solid-phase conduction by having low thermal conductivity and nearly "point" contact with the metal sheets (col. 11, lines 61-65).

The Examiner's Proposed Combination of Benson with Hunter

10. In the first full paragraph of page 3 of the Office Action, the Examiner concedes that Benson does not disclose the use of inorganic powders and porous organic foams inside the vacuum envelope. However, he argues that Hunter teaches a vacuum panel which contains at least one filler selected from inorganic powders and porous organic foams (col. 9, lines 21-29) and concludes that:

> At the time of the invention, it would have been obvious to a person of ordinary skill in the art to include a powder or foam as taught by Hunter in the panel taught by Benson et al. The motivation to do so would have been to increase the R-value significantly (Hunter, column 9, lines 46-49).

In my opinion, such a statement is absolutely groundless and contradictory to the teachings of both Benson and Hunter for the reason discussed below.

11. First, as already pointed out above, Benson specifically excludes the presence inside his vacuum envelope of fillers which may produce billions of microscopically fine glass fibers and perlite particles. This would also exclude the inorganic materials listed by Hunter and the inorganic powders of the presently claimed invention, since they tend to produce microscopic fibers or particles. I also wish to point out that porous organic foams likewise have the tendency to generate powders, and hence would be excluded by the teachings of Benson for at least that reason.

12. The Examiner's alleged "motivation ... to increase the R-value significantly" is also erroneous and based on a faulty reasoning or misinterpretation of Hunter. The passage cited by the Examiner (col. 9, lines 46-49) states that "... the tensile and compressive elements 14 and 12 respectively may be alternated to increase the R-value of the barrier significantly." However, elements 14 and 12 are not made of inorganic powder or porous organic foam, but are variously

corrugated sheets having a sine-like wave design (*e.g.*, Fig. 1) or more complex beam-like and cone-like designs (*e.g.*, Fig. 7). The stacking of these elements, as defined at col. 4, lines 47-51, is such that contact surfaces between two elements are reduced to a minimum to minimize the thermal conductivity in the solid phase, and are preferably reduced to "points of contact" between the elements (col. 6, lines 5-32 and particularly lines 21-25).

13. While it is true that Hunter shows elements 18, 19 (Figs. 10 and 11), which may be in the form of shaped polymeric foams or compacted powders, it is essential, according to Hunter, that these elements 18, 19 be used together with elements of the type 12, 14 to obtain the result of a high R-value.

The Examiner's Erroneous Assumptions Regarding R-value

14. In paragraph 6 at page 10 of the Office Action, the Examiner states that Hunter "recognized that stationary air inhibits heat transfer" (col. 6, lines 40-43), thus teaching that stationary air trapped in the gas pockets of powder or foam would increase the R-value and provide motivation for the combination. This statement and conclusion of the Examiner are contrary to the teachings of Hunter and the knowledge of a person of at least ordinary skill in the art at the time of the invention and up to the present time. Thus, the entire paragraph at col. 6, lines 33-67 of Hunter is based on the premise that the panel be evacuated (col. 6, lines 35-37). The gases referred to therein are the traces of residual gases remaining after the evacuation of a closed space (if no residual gases were present, there would be no need of getter systems).

15. Benson already obtains a panel having a good vacuum level of at least 10^{-6} Torr or less (col. 11, lines 46-48), and vacuum achieves the best thermal insulation. Benson also provides for the use of a getter material (col. 4, lines 51-52). Therefore, the introduction of a filler according to Hunter in a panel of Benson would not involve any improvement in the contribution of convection (i.e., gas motion) to thermal conductivity, because there are no gases in movement in Benson's panel. To the contrary, the conductive contribution would increase in Benson by adding a filler according to Hunter, due to the thermal conduction of the solid filler material. Accordingly, the conclusion reached by the Examiner is simply incorrect, because combining the teachings of Hunter and Benson would decrease the R-value, instead of increasing

it. For the Examiner's information, the panels prepared at SAES according to this invention typically contain as filler either polyurethane or silica powder. With polyurethane, an R-value of 24 is typically obtained at a vacuum inside the panel of 0.1 mbar, while with silica typical values are $R \approx 32$ at a vacuum degree of 10 mbar.

16. In sum, the combination of Benson with Hunter would not have been suggested or even thinkable to one of ordinary skill in the art at the time of the invention because:

(a) Benson clearly states that his panels are incompatible with a filler in particulate form (fibers, powders, etc.);

(b) Hunter teaches that an increase in R-value is due to the presence of tensile and compressive elements 14 and 12, not to the use of a powder or foam filler;

(c) Hunter teaches that the elements 14 and 12 must be "as thin as possible and the contact surfaces reduced to a few points only";

(d) It is contrary to the teachings of both Benson and Hunter to use a filling material, such as the powders and foams of the presently claimed invention, that fills the space between the barrier sheets; and

(e) Filling a panel of Benson with a filling material would lead to a worsening of the thermal conductivity (increased by the contribution of the foam or powder) and would be meaningless.

Bending of Metal Sheets

17. In the paragraph at the bottom of page 3 of the Office Action, the Examiner notes that Benson discloses that his metal sheets "may be bent" (col. 6, lines 48-54), but acknowledges that Benson does not disclose the method by which the panel is curved. In fact, Benson further discloses that with proper spacing of the spacer beads 16, the insulation panel can be bent or formed around a curve without crimping or allowing a cold short between the two wall sheets (col. 7, lines 2-8). However, no difficulties are reported by Benson for the bending operation, so that it cannot be understood why a person skilled in the art would have made use of the

calendaring operation of Späth for bending the sheets, particularly in view of the likelihood of breaking the glass or ceramic spacer beads, when subjecting the panel to calendaring.

18. In the first paragraph of page 4 of the Office Action, the Examiner acknowledges that Benson does not disclose a vacuum panel comprising at least one metal (barrier) sheet having a thickness not greater than 100 μm. Instead, he relies upon Applicant's admission in the Background of the present application that envelopes made of barrier sheets having a thickness not greater than 100 μm are known in the art (paragraph [0005]). The Examiner concludes:

> At the time of the invention, it would have been obvious to a person of ordinary skill in the art to assemble and curve a vacuum panel as taught by Benson et al. in view of Späth et al. having a barrier sheet of less than 100 μm thickness. The motivation to do so would have been to create a high-performance insulation material occupying less volume that is therefore more valuable (Benson et al., column 12, lines 12-14).

19. Based on this reasoning, one could ask why Benson, although recognizing the advantages resulting from space-saving and a lower weight of the panel, teaches the use of metal sheets having a minimum thickness of 0.2 mm (col. 11, lines 53-54), i.e., 200 μm or twice the maximum thickness of the barrier sheet of the presently claimed invention. One reason could be Benson's statement at col. 6, lines 48-57, particularly lines 52-54, that the sheets must be "sufficiently hard or rigid so that they do not form around the spherical spacers, yet are bendable enough so that the panel can be formed in curves."

20. In actuality, sheets of a lower thickness, if used in a panel of Benson under a pressure difference of about 1 atmosphere (i.e., about 1 kg/cm^2) between the outside and inside of the panel, could show structural problems due to excessive stress, such as to break the sheets at points of contact with the internal spacers. Such pressure stress is not a problem with the presently claimed invention, since the filling material fully supports and spaces the sheets of the panel after creation of the vacuum.

Alleged Bendability of Hunter Panels

21. In the first full paragraph at page 3 of the Office Action, the Examiner takes the position that:

> Hunter teaches a bendable vacuum panel (column 8, lines 57-67), which contains at least one filler selected from the group consisting of inorganic powders and porous organic foams (column 9, lines 21-29).

In fact, Hunter discloses at least two embodiments, and the Examiner has improperly assumed that the bendability of the panels of the first embodiment (as shown, for example, in Figs. 8 and 9) can be attributed to the second embodiment (shown, for example, in Figs. 10 and 11 and described at col. 9, lines 16-49), and *vice-a-versa*. The only passage of Hunter mentioning the possibility of bending (col. 8, lines 62-66) relates to the first embodiment (Figs. 8 and 9), which uses tensile and compressive elements 12 and 14 only, without any thermal insulation elements 18 and 19. The thermal insulation elements 18 and 19 are solid, formable, open structured materials made of foam, compacted powders or the like, used only in the second embodiment of Figs. 10 and 11. Nowhere in Hunter is it stated that the panels of the second embodiment can be curved.

22. It is my understanding from reports from our attorneys that, during a recent telephone interview, the Examiners took the position that the Benson panels with the filler of Hunter are "probably still bendable," because both the filler and the barrier sheets are flexible themselves. In my opinion, the Examiners' assumption is unwarranted, and their conclusion is incorrect. Thus, contrary to the Examiners' assumption of probable bendability, the materials cited by Hunter at col. 9, lines 24-28 are all rigid, and the xerogel and ceramic foams are also brittle.

23. If the fillers of Hunter were flexible as contended by the Examiners, in a structure like that of Fig. 10, the walls 20 and 30 would compress the elements 18, 19 against the element 14 under the action of external pressure. As a result, the peculiar feature of the Hunter panels of having vacuum spaces between stacked elements would be lost. In other words, it is necessary that the "teeth" of elements 18, 19 be able to resist the pressure exerted by the panel walls, so

that the material of which they are made must necessarily be rigid. The Examiners' assumption of flexibility of the Hunter fillers is groundless, and the entire Hunter disclosure shows clear evidence to the contrary.

The Inapplicability of Späth

24. It is already acknowledged at paragraph [0013] of the present specification that the operation of calendaring is well known and applied in the mechanical field for curving metallic plates. However, we found that this operation can be successfully applied to vacuum panels, a possibility which was not foreseeable because of the discontinuity of the filling materials of vacuum panels and the unpredictability of their deformation behavior under mechanical stress. The breaking of foam boards was also expectable, given the general fragility of polymeric foams.

25. The Späth patent adds nothing to such prior art acknowledged in the present application. In fact, Späth does not even disclose the calendaring of panels, but only the folding or bending of metal profiles and sections, particularly hollow profiles.

26. Further, the hollow profiles or sections of Späth are self-supporting metallic parts. Although no indication is given of the thickness of such metallic parts, metallic tubes are mentioned and shown in the drawing, which must have a thickness of at least some millimeters. In contrast, the barrier sheet of the panels of the presently claimed invention, which may include a metal layer (claim 13), have a negligible thickness, being only a fraction of the multi-layer barrier thickness (100 μm at maximum). Accordingly, the supporting portion for the panel envelopes of the presently claimed invention is the filler, not the extremely thin metal layer.

Conclusion

27. In sum, the presently claimed invention is directed to a method for curving thin-walled vacuum panels supported by a porous or discontinuous filling material of inorganic powders and/or porous organic foams by a calendaring operation. The Examiner has failed to cite any prior art document in the technical field of vacuum insulating panels that discloses

calendaring thereof. For all of the above reasons, the Examiner's conclusions of obviousness are unsupported and based on erroneous assumptions and reasoning.

I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further, that those statements were made with the knowledge that willful false statements the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

3/8/2006
Date

Paolo Manini
Paolo Manini

X. RELATED PROCEEDINGS APPENDIX

A. BPAI Proceedings

None

B. Court Proceedings

None

XI. AUTHORITIES APPENDIX

A. MEMORANDUM, Deputy Commissioner for Patent Operations, May 3, 2007

UNITED STATES PATENT AND TRADEMARK OFFICE

COMMISSIONER FOR PATENTS
UNITED STATES PATENT AND TRADEMARK OFFICE
P.O. BOX 1450
ALEXANDRIA, VA 22313-1450
www.uspto.gov

MEMORANDUM

DATE: May 3, 2007

TO: Technology Center Directors

Margaret A. Focarino

FROM: Margaret A. Focarino
Deputy Commissioner
for Patent Operations

SUBJECT: Supreme Court decision on *KSR Int'l. Co., v. Teleflex, Inc.*

The Supreme Court has issued its opinion in *KSR*, regarding the issue of obviousness under 35 U.S.C. § 103(a) when the claim recites a combination of elements of the prior art. *KSR Int'l Co. v. Teleflex, Inc.*, No 04-1350 (U.S. Apr. 30, 2007). A copy of the decision is available at http://www.supremecourtus.gov/opinions/06pdf/04-1350.pdf. The Office is studying the opinion and will issue guidance to the patent examining corps in view of the *KSR* decision in the near future. Until the guidance is issued, the following points should be noted:

(1) The Court reaffirmed the *Graham* factors in the determination of obviousness under 35 U.S.C. § 103(a). The four factual inquiries under *Graham* are:

- (a) determining the scope and contents of the prior art;
- (b) ascertaining the differences between the prior art and the claims in issue;
- (c) resolving the level of ordinary skill in the pertinent art; and
- (d) evaluating evidence of secondary consideration.

Graham v. John Deere, 383 U.S. 1, 17-18, 148 USPQ 459, 467 (1966).

(2) The Court did not totally reject the use of "teaching, suggestion, or motivation" as a factor in the obviousness analysis. Rather, the Court recognized that a showing of "teaching, suggestion, or motivation" to combine the prior art to meet the claimed subject matter could provide a helpful insight in determining whether the claimed subject matter is obvious under 35 U.S.C. § 103(a).

(3) The Court rejected a rigid application of the "teaching, suggestion, or motivation" (TSM) test, which required a showing of some teaching, suggestion, or motivation in the prior art that would lead one of ordinary skill in the art to combine the prior art elements in the manner claimed in the application or patent before holding the claimed subject matter to be obvious.

(4) The Court noted that the analysis supporting a rejection under 35 U.S.C. § 103(a) should be made explicit, and that it was "important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the [prior art] elements" in the manner claimed. The Court specifically stated:

> Often, it will be necessary . . . to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an **apparent reason** to combine the known elements in the fashion claimed by the patent at issue. To facilitate review, this analysis **should be made explicit**.

KSR, slip op. at 14 (emphasis added).

Therefore, in formulating a rejection under 35 U.S.C. § 103(a) based upon a combination of prior art elements, it remains necessary to identify the reason why a person of ordinary skill in the art would have combined the prior art elements in the manner claimed.